

REMARKS

Claims 1-20 are now pending in the application.

I. THE AMENDMENT TO THE CLAIMS

Claim 1 is amended to make clear that the chirped Bragg grating etalon optical signal has a precise set of optical reference signals. In effect, the "the" was removed from the last line of claim 1 to provide a proper antecedent basis for all elements recited therein.

Claim 20 is amended to recite that the precise set of the optical reference signals includes a series of peaks covering most of a source spectral width of the broadband source, and that the power at the beginning and end of the spectrum of the broadband source is passed substantially unaffected by the chirped Bragg grating etalon, as described in the patent application, page 4, lines 1-6. See also page 10, lines 17-22.

Claim 17 is added to recite that the desired filter profile includes a precise set of optical reference signals in relation to independent claim 16. Similar to claim 20 discussed above, claims 18-19 are added to depend directly or indirectly from claim 17 and recite the subject matter of dependent claim 20.

## II. THE PROBLEM IN THE ART AND THE CLAIMED SOLUTION

Pages 1-2 of the patent application set forth the problem in the art being addressed by the claimed invention. In summary, the use of an etalon formed by broadband fiber Bragg grating pairs as shown in Figure 1 of the patent application results in a very limited set of resonant frequencies, as described in the patent application on page 2, line 20, through page 3, line 3. For example, if a resonant optical frequency is outside a very limited region, the light will pass through the fiber Bragg grating etalon cavity unaffected. For a set of reference optical frequencies, the unaffected light is most undesirable and would merely result in the provision of a very limited spectrum of optical reference signals. The use of a multiplicity of etalons formed from a series of broadband fiber Bragg grating pairs in order to overcome this problem raises a whole different set of problems, including issues related to the differing temperature sensitivities of the multiplicity of etalons formed from the broadband fiber Bragg grating pairs.

The inventors recognized this problem in the art and provided a solution to the same. To solve this problem, the inventors designed an optical system featuring a chirped Bragg grating etalon that responds to the broadband optical signal, for providing a chirped Bragg grating etalon optical signal having a precise set of optical reference signals, as recited in claim 1. The precise set of the optical reference signals includes a

series of peaks covering most of a source spectral width of the broadband source with the power at the beginning and end of the spectrum of the broadband source passed substantially unaffected by the chirped Bragg grating etalon, as recited in dependent claim 20.

In effect, the whole thrust of the claimed invention is to use a broadband source in combination with a single chirped Bragg grating etalon in order to provide a precise set of optical reference signals having a broad spectrum of frequencies of interest. As a person skilled in the art would appreciate, the use of the chirped Bragg grating etalon to provide the desired series of peaks covering most of the source spectral width of the broadband source substantially eliminates the differing temperature sensitivities problem that might otherwise occur with the use of the multiplicity of etalons formed from the broadband fiber Bragg grating pairs like that of the prior art shown in Figure 1 of the patent application.

In light of this, the rejection of the claims is respectfully traversed.

### III. THE OBVIOUSNESS REJECTION

Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kringlebotn (United States Patent No. 6,097,487) in view of Farhadiroushan (United States Patent No. 5,754,293).

It is respectfully submitted that the proposed combination of Kringlebotn in view of Farhadiroushan does not teach or suggest an optical system featuring a chirped Bragg grating etalon that responds to the broadband optical signal, for providing a chirped Bragg grating etalon optical signal having a precise set of optical reference signals, as recited in claim 1.

The reasoning on pages 2-3 of the Office Action recognizes that Kringlebotn does not teach or suggest either the use of an etalon or a chirped Bragg grating etalon as these terms are known and used in the art. In order to make up for this deficiency, the reasoning on pages 2-3 of the Office Action is pointing to Farhadiroushan to fill this gap.

However, it is respectfully submitted that Farhadiroushan does not suggest the use of a chirped Bragg grating etalon in combination with a broadband optical source to solve the problem being address by the inventors. Further, Farhadiroushan also does not suggest the use of a chirped Bragg grating etalon in combination with a broadband optical source to provide a precise set of optical reference signals, especially having a series of peaks covering most of a source spectral width of the broadband

source with the power at the beginning and end of the spectrum of the broadband source passed substantially unaffected by the chirped Bragg grating etalon, as recited in dependent claim 20.

For example, Farhadiroushan discloses an optical sensor system having a series of sensing interferometers 10, each with a respective specific wavelength  $\lambda_1, \lambda_2, \dots, \lambda_n$ . Each sensing interferometers 10 is formed by an in-line fiber Bragg grating pair that provide a single separate wavelength of interest. The reasoning in the Office Action, page 3, paragraph 1, clearly recognizes that the sensing interferometers 10 are not formed from chirped Bragg gratings, as claimed herein.

Foremost, it is respectfully submitted that Farhadiroushan is a sensing device, and neither recognizes problems related to designing an optical system for providing a set of optical references signals, nor provides suggestions about solutions related to such optical system designs for providing a set of optical reference signals, including the use of a chirped Bragg grating etalon to solve the problem being addressed by the instant inventors. In view of this, it is not clear on the record why one of ordinary skill would be motivated to look to Farhadiroushan's teaching related to sensing device to solve the problem related to providing a set of reference signals like that being addressed by the instant inventors.

Moreover, it is respectfully submitted that the proposed combination with multiple substitutions/modifications is not

proper under the Patent laws, because nothing in either cited reference suggests either to make such a combination then subsequent substitutions/modifications, or a reason why one of ordinary skill in the would be motivated to do the same to solve the problem being addressed by the instant inventors.

For instance, in the proposed combination a single one of the multiplicity of Farhadiroushan's non-chirped inline fiber Bragg grating pairs from the sensing interferometers 10 is being substituted for a single one of the multiplicity of fiber Bragg gratings 6 shown in Figure 1 of Kringlebotn. (The remaining multiplicity of fiber Bragg gratings 6 shown in Figure 1 of Kringlebotn are apparently not being used.) However, nothing in either cited reference suggests either to make such a first substitution/modification, or a reason why one of ordinary skill in the art would be motivated to do the same to solve the problem being addressed by the instant inventors. Further, clearly this first substitution does not even result in the claimed invention.

In view of this, in the proposed combination a single chirped Bragg grating etalon like the one claimed herein is next being substituted for Farhadiroushan's single non-chirped inline fiber Bragg grating pair in order to get the precise set of optical reference signals, as claimed herein. However, in the absence of that shown and described in the instant patent application, nothing in either cited reference suggests either to make such a second substitution/modification, or a reason why one

of ordinary skill in the art would be motivated to do the same to solve the problem being addressed by the instant inventors.

Finally, it is respectfully submitted that, while the reasoning in the Office Action, page 3, paragraph 2, states that "it would be obvious" to make such a combination and subsequent substitutions/modifications, the same reasoning does not say why "it would be obvious", especially to solve the problem being addressed by the instant inventors. For example, nothing in the reasoning in the Office Action, page 3, paragraph 2, or on the record as a whole, suggests why a reason why one of ordinary skill in the art would be motivated to use Farhadiroushan's single non-chirped inline fiber Bragg grating pair that is otherwise used to provide a single separate wavelength of interest in Farhadiroushan's optical sensing system, then modify it into a chirped fiber Bragg grating etalon to instead provide a set of reference signals in Kringlebotn's device for measurement of optical wavelengths. For the reasons discussed above, it is respectfully submitted that neither cited reference on the record makes up for this deficiency in the reasoning in the Office Action, page 3, paragraph 2.

For all the aforementioned reasons, it is respectfully submitted that the proposed combination with multiple substitutions/modifications is not proper under the Patent laws and smack of hindsight reconstruction after the Patent Office has had the benefit of reading the instant patent application.

Dependent Claims 2-15

Claims 2-15 depend from claim 1, contain all the limitations therein, and are deemed patentable over Kringlebotn for the reasons set forth above.

Claims 16-19

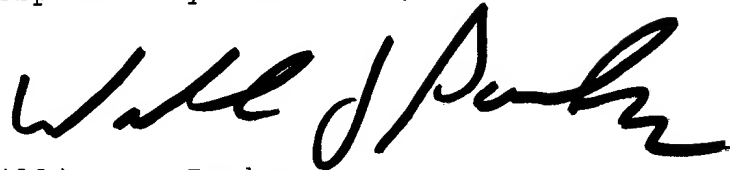
For substantially similar reasons, claims 16-19 are deemed patentable over the proposed combination.

IV. CONCLUSION

For all these reasons, it is respectfully requested that the obviousness rejection be reconsidered and withdrawn.

Reconsideration and early allowance of all the claims is respectfully requested.

Respectfully submitted,



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